AMENDMENTS TO CLAIMS

● Please delete claims 2, 16, 20-28, 30-32, 55, 64-69, 71, 72, renumbered claims 82, 86-89, and 91.

● Please amend pending claims 1, 3, 4, 15, 18, 19, 29, 54, 56, 63, 70, renumbered claims 80, 81, 83-85, and 90, as indicated below.

A complete listing of all claims and their status in the application are as follows:

1.   (currently amended) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising:

a phase noise detector comprising;

a sorter;

a rotator coupled to the sorter; and

a comparator coupled to the rotator;

a compression detector;

an interference detector; and

a constellation storage coupled to the phase noise detector, the compression detector, and the interference detector.

2.   (canceled)

3.   (currently amended) The device of ~~Claim 2~~ Claim 1 wherein the rotator rotates a vector utilizing a method comprising the steps of:

converting the vector's end point coordinates into polar coordinates;

adjusting the angle coordinate; and

reconverting the end point coordinates to Cartesian coordinates.

4.   (currently amended) The device of ~~Claim 2~~ Claim 1 wherein the rotator rotates a vector utilizing the matrix:

$$\begin{vmatrix} \cos\Theta & \sin\Theta \\ -\sin\Theta & \cos\Theta \end{vmatrix}$$

5.   (original)   The device of Claim 2 wherein the comparator evaluates the inequality:

$$\sigma_x >= C\sigma_y$$

6. (original) The device of Claim 5 wherein C = 1.5.

7. (original) The device of Claim 1 wherein the compression detector comprises:

a sorter; and

an X/Y deviation determinator coupled to the sorter.

8. (original) The device of Claim 1:

wherein the phase noise detector comprises:

a rotator; and

a comparator coupled to the rotator;

wherein the compression detector comprises an X/Y deviation determinator; and

wherein the phase noise detector and compression detector share a sorter coupled to

the rotator and to the X/Y deviation determinator.

9. (original) The device of Claim 7 wherein the X/Y deviation determinator evaluates the inequality:

$$Z_{avg} <= CZ_{exp}$$

10. (original) The device of Claim 9 wherein C = 0.98.

11. (original) The device of Claim 7 wherein the X/Y deviation determinator analyzes a top row of cells of a constellation.

12. (original) The device of Claim 11 wherein the X/Y deviation determinator evaluates the inequalities:

$$Y_{avg}[b_4] < Y_{avg}[b_3] < Y_{avg}[b_2] < Y_{avg}[b_1]$$

and

$$Y_{avg}[b_{-4}] < Y_{avg}[b_{-3}] < Y_{avg}[b_{-2}] < Y_{avg}[b_{-1}]$$

13. (original) The device of Claim 7 wherein the X/Y deviation determinator analyzes a column of cells of a constellation.

14. (original) The device of Claim 1 wherein the interference detector comprises:

a sorter;

an error calculator coupled to the sorter;

a distribution chart coupled to the error calculator; and

a data peak detector coupled to the distribution chart.

15. (currently amended) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising a phase noise ~~detector.~~ detector, wherein the phase noise detector comprises:

a sorter;

a rotator coupled to the sorter; and

a comparator coupled to the rotator.

16. (cancelled)

17. (original) The device of Claim 15 wherein the rotator rotates a vector by utilizing a method comprising the steps of:

converting the end point coordinates into polar coordinates;

adjusting the angle coordinate; and

reconverting the end point coordinates to Cartesian coordinates.

18. (currently amended) The device of ~~Claim 16~~ Claim 15 wherein the rotator rotates a vector utilizing the matrix:

$$\begin{vmatrix} \cos\Theta & \sin\Theta \\ -\sin\Theta & \cos\Theta \end{vmatrix}$$

19. (currently amended) The device of ~~Claim 1~~ Claim 15 wherein:

wherein the phase noise detector comprises:

a rotator; and

a comparator coupled to the rotator;

wherein the compression detector comprises an X/Y deviation determinator;

wherein the interference detector comprises:

an error calculator;

a distribution chart;

a data peak detector; and

wherein the phase noise detector, compression detector, and interference detector

share a sorter coupled to the rotator, to the X/Y deviation determinator, and to

the error calculator.

Claims 20-28. (canceled)

29.　(currently amended)　A device for detecting impairments in a digital quadrature amplitude modulated signal comprising an interference detector. detector wherein the interference detector comprises:

a sorter;

an error calculator coupled to the sorter;

a distribution chart coupled to the error calculator; and

a data peak detector coupled to the distribution chart.

Claims 30-32. (canceled)

33.　(original)　A method for detecting compression in a digital quadrature amplitude modulated signal, the method comprising the steps of:

sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

selecting a sub-group of data points from the constellation;

determining the magnitude of the vectors from the origin of the constellation to each datum point of the sub-group;

determining the magnitude of a vector from the origin to an ideal point associated with the sub-group;

comparing the magnitude of the vectors from the origin of the constellation to each datum point to the magnitude of the vector from the origin to the ideal point associated with the sub-group;

determining from the comparison if compression is present; and

generating a signal indicating compression in the digital quadrature amplitude modulated signal if the determining step indicates compression is present.

34.　(original)　The method of Claim 33 wherein the sub-group is a cell of the constellation.

35.　(original)　The method of Claim 33 wherein the sub-group is a cell in a corner of the constellation.

36. (original)   The method of Claim 33 further comprising the step of averaging the magnitudes of the vectors from the origin of the constellation to each datum point of the sub-group.

37. (original)   The method of Claim 34 further comprising the step of averaging the magnitudes of the vectors from the origin of the constellation to each datum point of the sub-group.

38. (original)   The method of Claim 35 further comprising the step of averaging the magnitudes of the vectors from the origin of the constellation to each datum point of the sub-group.

39. (original)   The method of Claim 36 wherein the comparing step evaluates the inequality:

$$Z_{avg} <= CZ_{exp}$$

40. (original)   The method of Claim 39 wherein $C = 0.98$.

41. (original)   A method for detecting compression in a digital quadrature amplitude modulated signal, the method comprising the steps of:

sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

selecting more than one sub-group of data points from the constellation;

analyzing each datum point according to its selected sub-group;

comparing the analyzed data points for each sub-group to the analyzed data points of every other selected sub-group;

determining from the comparison if compression is present; and

generating a signal indicating compression in the digital quadrature amplitude modulated signal if the determining step indicates compression is present.

42. (original)   The method of Claim 41 wherein the selecting step selects more than one cell of the constellation.

43. (original)   The method of Claim 41 wherein the analyzing step averages a coordinate of each datum point according to its sub-group.

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44.   (original)   The method of Claim 43 wherein the averaging is according to each selected cell of the constellation.

45.   (original)   The method of Claim 42 wherein the selected cells constitute a row of the constellation.

46.   (original)   The method of Claim 45 wherein the selected cells constitute the top row of the constellation.

47.   (original)   The method of Claim 45 wherein the selected cells constitute the bottom row of the constellation.

48.   (original)   The method of Claim 45 wherein the selected cells constitute a column of the constellation.

49.   (original)   The method of Claim 45 wherein the comparing step evaluates the inequalities:

$$Y_{avg}[b_4] < Y_{avg}[b_3] < Y_{avg}[b_2] < Y_{avg}[b_1]$$

and

$$Y_{avg}[b_{-4}] < Y_{avg}[b_{-3}] < Y_{avg}[b_{-2}] < Y_{avg}[b_{-1}]$$

50.   (original)   A method for detecting non-coherent interference in a digital quadrature amplitude modulated signal, the method comprising the steps of:

sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

detecting an error signal for one or more data points of the constellation;

arranging the detected error signals;

detecting non-coherent interference from the arranged, detected error signals; and

generating a signal indicating non-coherent interference in the digital quadrature amplitude modulated signal if the detecting step indicates compression is present.

51.   (original)   The method of Claim 50 wherein:

the sorting step includes sorting data points into cells of the constellation; and

the detecting an error signal step includes determining the Euclidian distance between a datum point and the ideal point associated with the datum point's cell.

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52.   (original)   The method of Claim 51 wherein the arranging step includes constructing a histogram according to the error signals detected in the detecting step.

53.   (original)   The method of Claim 52 wherein the step of detecting non-coherent interference from the arranged, detected error signals includes detecting one or more peaks in the histogram that are indicative of non-coherent interference.

54.   (currently amended)   A device for detecting impairments in a digital quadrature amplitude modulated signal comprising:

means for detecting phase noise comprising;

means for sorting one or more digital quadrature amplitude modulated signal symbols;

means for rotating data points such rotating means coupled to the sorting means; and

means for comparing rotated data points such comparing means coupled to the rotating means.

means for detecting compression;

means for detecting interference; and

means for storing a constellation storage such storage means coupled to the phase noise detection means, the compression detection means, and the interference detection means.

55.   (canceled)

56.   (currently amended)   The device of Claim 55Claim 54 wherein the comparator means evaluates the inequality inequality:

$$\sigma_x >= C\sigma_y$$

57.   (original)   The device of Claim 56 wherein C = 1.5.

58.   (original)   The device of Claim 54 wherein the compression detection means comprises:

means for sorting one or more digital quadrature amplitude modulated signal symbols; and

means for determining X/Y deviations such means coupled to the sorting means.

59. (original) The device of Claim 58 wherein the X/Y deviation determining means evaluates the inequality:

$$Z_{avg} <= CZ_{exp}$$

60. (original) The device of Claim 59 wherein C = 0.98.

61. (original) The device of Claim 58 wherein the X/Y deviation determining means analyzes a top row of cells of a constellation and evaluates the inequalities:

$$Y_{avg}[b_4] < Y_{avg}[b_3] < Y_{avg}[b_2] < Y_{avg}[b_1]$$

and

$$Y_{avg}[b_{-4}] < Y_{avg}[b_{-3}] < Y_{avg}[b_{-2}] < Y_{avg}[b_{-1}]$$

62. (original) The device of Claim 54 wherein the interference detector comprises:

means for sorting one or more digital quadrature amplitude modulated signal symbols;

means for detecting an error signal coupled to the sorting means;

a distribution chart coupled to the error detection means; and

means for detecting peaks coupled to the distribution chart.

63. (currently amended) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising means for detecting phase ~~noise.~~ noise wherein the phase noise detection means comprises:

means for sorting one or more digital quadrature amplitude modulated signal symbols;

means for rotating data points such rotating means coupled to the sorting means; and

means for comparing rotated data points such comparing means coupled to the rotating means.

Claims 64-69. (canceled)

70. (currently amended) A device for detecting impairments in a digital quadrature amplitude modulated signal comprising means for detecting ~~interference.~~ interference wherein the interference detection means comprises:

means for sorting one or more digital quadrature amplitude modulated signal symbols;

means for detecting an error signal coupled to the sorting means;

a distribution chart coupled to the error detection means; and

means for detecting peaks coupled to the distribution chart.

Claims 71-72. (canceled)

73.   (original)   A device for detecting compression in a digital quadrature amplitude modulated signal comprising:

    means for sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

    means for selecting a sub-group of data points from the constellation;

    means for determining the magnitude of the vectors from the origin of the constellation to each datum point of the sub-group;

    means for determining the magnitude of a vector from the origin to an ideal point associated with the sub-group;

    means for comparing the magnitude of the vectors from the origin of the constellation to each datum point to the magnitude of the vector from the origin to the ideal point associated with the sub-group;

    means for determining from the comparison if compression is present; and

    means for generating a signal indicating compression in the digital quadrature amplitude modulated signal if the determining means indicates compression is present.

74.   (original)   The device of Claim 73 further comprising means for averaging the magnitudes of the vectors from the origin of the constellation to each datum point of the sub-group.

75.   (original)   The device of Claim 74 wherein the comparing means evaluates the inequality:

$$Z_{avg} <= CZ_{exp}$$

76.   (original)   A device for detecting compression in a digital quadrature amplitude modulated signal comprising:

    means for sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

    means for selecting more than one sub-group of data points from the constellation;

    means for analyzing each datum point according to its selected sub-group;

    means for comparing the analyzed data points for each sub-group to the analyzed data points of every other selected sub-group;

means for determining from the comparison if compression is present; and

means for generating a signal indicating compression in the digital quadrature amplitude modulated signal if the determining means indicates compression is present.

77.   (original)   The device of Claim 76 wherein the analyzing means averages a coordinate of each datum point according to its sub-group.

78.   (original)   The device of Claim 77 wherein the comparing means evaluates the inequalities:

$$Y_{avg}[b_4] < Y_{avg}[b_3] < Y_{avg}[b_2] < Y_{avg}[b_1]$$

and

$$Y_{avg}[b_{-4}] < Y_{avg}[b_{-3}] < Y_{avg}[b_{-2}] < Y_{avg}[b_{-1}]$$

79.   (original)   A device for detecting non-coherent interference in a digital quadrature amplitude modulated signal comprising:

means for sorting the symbols of the digital quadrature amplitude modulated signal into a constellation;

means for detecting an error signal for at least one datum point of the constellation;

means for arranging the detected error signals;

means for detecting non-coherent interference from the arranged, detected error signals; and

means for generating a signal indicating non-coherent interference in the digital quadrature amplitude modulated signal if the detection means indicates compression is present.

77.80.   (currently amended)   The device of Claim 76.79 wherein:

the sorting means includes means for sorting data points into cells of the constellation; and

the detection means includes means for determining the Euclidian distance between a datum point and the ideal point associated with the datum point's cell.

78.81.   (currently amended)   A memory device for storing program instruction steps comprising:

a phase noise detector comprising;

a sorter;

a rotator; and

a comparator;

a compression detector; and

an interference detector.

Claim ~~79.~~ 82. (canceled)

~~80.~~83 (currently amended)   The memory device of Claim ~~78~~ 81 wherein the compression detector comprises:

a sorter; and

an X/Y deviation determinator.

~~81.~~84 (currently amended)   The memory device of Claim ~~78~~ 81 wherein the interference detector comprises:

a sorter;

an error calculator;

a distribution chart; and

a data peak detector.

~~82.~~85. (currently amended)   A memory device for storing program instruction steps comprising a phase noise ~~detector.~~ detector wherein the phase noise detector comprises:

a sorter;

a rotator; and

a comparator.

Claims ~~83-86.~~ 86-89. (canceled)

~~87.~~90. (currently amended)   A memory device for storing program instruction steps comprising an interference ~~detector.~~ detector wherein the interference detector comprises:

a sorter;

an error calculator;

a distribution chart; and

a data peak detector.

Claim ~~88.~~ 91. (canceled)